WHAT IS CLAIMED IS:

1. An image processing apparatus for processing complementary color image data output from an image capturing element including a complementary-color filter, comprising:

a middle-high-range luminance component compensation section for compensating for a middle-high-range luminance component of a low-frequency luminance signal generated based on the complementary color image data such that the low-frequency luminance signal has substantially an ideal frequency characteristic which is lower than or equal to a predetermined frequency.

2. An image processing apparatus for processing complementary color image data output from an image capturing element including a complementary-color filter, comprising:

a middle-high-range luminance component extraction section for extracting a middle-high-range luminance component having a zero amplitude at an angular frequency $\omega = \pi$ and a maximum amplitude at an angular frequency ω between $\pi/2$ and π from a first luminance

signal generated based on complementary color image data of four neighboring pixels; and

a first synthesis section for adding the middle-high-range luminance component to a low-frequency luminance signal generated based on the complementary color image data to generate a second luminance signal.

3. An image processing apparatus according to claim 2, wherein the middle-high-range luminance component extraction section uses at least one even-number-size filter to arithmetically process the first luminance signal.

4. An image processing apparatus according to claim 3, wherein the even-number-size filter is a two-dimensional filter, and has coefficients symmetrical with respect to a x-direction and a y-direction.

5. An image processing apparatus according to claim 4, wherein:

the even-number-size filter includes a first low-pass filter having a differentiation capability and a second low-pass filter; and

a difference between an output obtained by

arithmetically processing the first luminance signal using the first low-pass filter and an output obtained by arithmetically processing the first luminance signal using the second low-pass filter is output as the middle-high-range luminance component.

6. An image processing apparatus according to claim 5, further comprising a first luminance signal generation section for generating the first luminance signal by adding complementary color image data from four neighboring pixels out of the complementary color image data together.

7. An image processing apparatus according to claim 3, wherein:

the even-number-size filter includes a first low-pass filter having a differentiation capability and a second low-pass filter; and

a difference between an output obtained by arithmetically processing the first luminance signal using the first low-pass filter and an output obtained by arithmetically processing the first luminance signal using the second low-pass filter is output as the middle-high-range luminance component.

8. An image processing apparatus according to claim 7, further comprising a first luminance signal generation section for generating the first luminance signal by adding complementary color image data from four neighboring pixels out of the complementary color image data together.

9. An image processing apparatus according to claim 8, further comprising:

a middle-range luminance extraction section for extracting a middle-range luminance component based on the second luminance signal;

a high-range luminance extraction section for extracting a high-range luminance component based on the second luminance signal; and

a second synthesis section for adding at least one of the middle and high-range luminance components to the second luminance signal to generate a third luminance signal.

10. An image processing apparatus according to claim 3, further comprising a first luminance signal generation section for generating the first luminance signal by

adding complementary color image data from four neighboring pixels out of the complementary color image data together.

11. An image processing apparatus according to claim 3, further comprising:

a middle-range luminance extraction section for extracting a middle-range luminance component based on the second luminance signal;

a high-range luminance extraction section for extracting a high-range luminance component based on the second luminance signal; and

a second synthesis section for adding at least one of the middle and high-range luminance components to the second luminance signal to generate a third luminance signal.

12. An image processing apparatus according to claim 2, further comprising a first luminance signal generation section for generating the first luminance signal by adding complementary color image data from four neighboring pixels out of the complementary color image data together.

13. An image processing apparatus according to claim 2, further comprising:

an interpolation section for calculating missing components for each pixel having Ye-, Cy-, Mg-, or Gr-component by interpolation to obtain a complementary image signal before the low-frequency luminance signal is generated,

wherein the interpolation section calculates missing components by arithmetically processing the complementary color image data using an odd-number-size filter.

14. An image processing apparatus according to claim 13, further comprising:

an RGB generation section provided at a subsequent stage of the interpolation section, for generating R, G and B image signals based on the complementary color image from the interpolation section.

15. An image processing apparatus according to claim 14, wherein the RGB generation section calculates R, G and B image signals based on the complementary-color image signal output from the interpolation section in accordance with expression below:

$$\begin{pmatrix} R \\ G \\ B \end{pmatrix} = \begin{pmatrix} C_{11} & C_{12} & C_{13} & C_{14} \\ C_{21} & C_{22} & C_{23} & C_{24} \\ C_{31} & C_{32} & C_{33} & C_{34} \end{pmatrix} \begin{pmatrix} Ye \\ Cy \\ Gr \\ Mg \end{pmatrix}$$

16. An image processing apparatus according to claim 15, further comprising:

a middle-range luminance extraction section for extracting a middle-range luminance component based on the second luminance signal;

a high-range luminance extraction section for extracting a high-range luminance component based on the second luminance signal; and

a second synthesis section for adding at least one of the middle and high-range luminance components to the second luminance signal to generate a third luminance signal.

17. An image processing apparatus according to claim 2, further comprising:

a middle-range luminance extraction section for extracting a middle-range luminance component based on the second luminance signal;

a high-range luminance extraction section for

extracting a high-range luminance component based on the second luminance signal; and

a second synthesis section for adding at least one of the middle and high-range luminance components to the second luminance signal to generate a third luminance signal.

18. An image processing apparatus according to claim 2, further comprising:

a median filtering section for removing noise contained in a color difference signal generated based on the complementary color image data,

wherein the median filtering section includes a plurality of median filters having different sizes, the sizes of the median filter are switched depending on an amount of change in the color difference signal.